Activity Title: Southeast Fishery Independent Survey/ Box 40 Trap Analysis

Subject (Focus/Topic): To observe collect and analyze authentic scientific data to determine the distribution and abundance of fish in box 40.

Grade Level: 9-12

Average Learning Time: 3 (45 minute) periods

Lesson Summary (Overview/Purpose): In this lesson, students will take part in a NOAA Southeast Fishery-Independent Survey (SEFIS) experience. They will discuss trap site selection; participate in data collection and video analysis.

Overall Concept (Big Idea/Essential Question): Students will be able to determine the relative abundance of fish in a specific habitat in the Atlantic Ocean.

Specific Concepts (Key Concepts):

1. Students will understand relative abundance of reef fish in the Atlantic Ocean.
2. Students will be able to identify different habits from video footage
3. Students will be able to graph data from their selected trap.

Focus Questions (Specific Questions):

1. What is a Tomtate (White grunt, Bank Seabass, Black Seabass, Spottail Pinfish, Gag, Knob Porgy, Gray Triggerfish, Porgy, Red Porgy) and what is their habitat range.
2. What are the different types of habitats found in this survey (difference between a hard-bottom and a sand bottom)
3. What type of habitat does each fish prefer
4. How are bathymetric maps used to find hard-bottom habitats?

Objectives/Learning Goals:

1. Students will be able to correctly identify the ten fish found in trap 40.
2. Students will be able to use video footage to identify habitats and reef fish.
3. Students will be able to graph the data collected throughout this lesson.

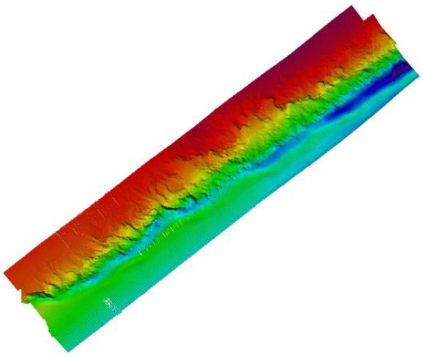
Background Information: To do this lesson students need to be able to identify the fish found in the SEFIS. Depending on how the lesson is organized either the teacher will find all the information and pictures on the chosen fish or students can complete a jigsaw activity to research the fish. Students will need to understand a bathymetric map of the seafloor and the reasoning behind how sites are selected. Finally students will need to be able to graph data that is obtained throughout the lesson.

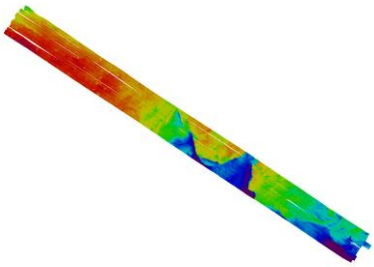
Common Misconceptions/Preconceptions: A major misconception that students have is that there are unlimited fish in the ocean and that the seafloor is flat with the same habitat throughout.

Materials: Computer to access videos, Information on fish caught in each trap (cut up and put into envelopes), bathymetric maps, digital camera projector or powerpoint for pictures.

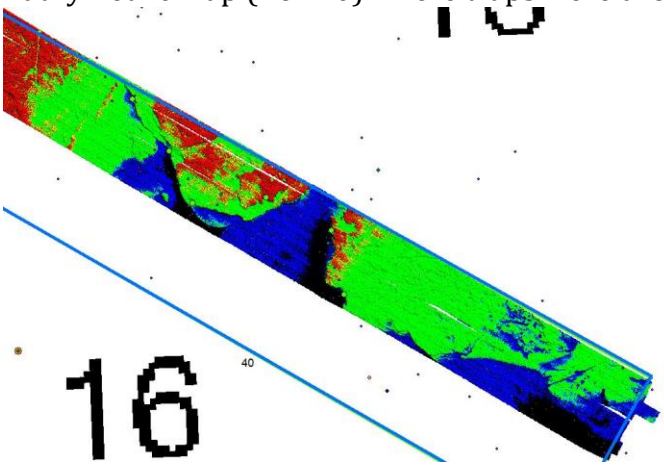
Sample Bathymetric Map (box 17)
(Box 40)

Bathymetric Map





Bathymetric Map (Box 40) where traps were dropped shown with green dots.



Fish Caught in Each Trap: all measurements taken in millimeters (mm)

Trap 1

Black Sea Bass	Spottail Pinfish	Tomtate
209	140	198
226	207	211
	156	206
	165	214
	261	

Trap 2

Red Porgy	Spottail Pinfish	White Grunt		Gray Triggerfish	Bank Sea bass	Black Sea Bass	
422	137	421	320	381	215	315	212
436		271	428		206	256	201
407		280	263		207	285	223
		351	329		227	255	233
		265	365		287	253	280
		237	304		205	256	199
		261	294			222	229
		267				214	336
		200				283	216

Trap 3

Black Sea bass	Bank Sea Bass
211	205
200	227
186	
199	
205	
200	

Trap 4

Black Sea bass		Porgy	White Grunt	Bank Sea bass	Gray Triggerfish	Knob Porgy
225	255	345	410	210	433	371
239	196		265	225		
277	270		360	205		
289	240		245	200		
236	185		420	204		
196						

Trap 5

Bank Sea bass	Spottail Pinfish	Black Sea bass		White Grunt	Tomtate	
178	227	290	219	271	203	237
246	162	248	204	302	200	194
222		239	158	231	224	230
250		240	233	341	190	216
211		171	190	181	211	199
221		186		186	186	284
		258		236	235	241
		208		345	215	226
		185		348	200	211

Trap 6

Bank Sea bass	Tomtate	White Grunt		Black Sea bass		Gag
244	199	186	388	277	262	781
265	199	236	209	266	241	
	206	327	251	225	250	
	207	285	302	220	227	
	222	241	269	242	221	
		239	225	263		
		232		209		

Technical Requirements: Computer to research fish species and record data. The lesson can also be completed if the teacher finds information on the fish species beforehand to provide each group with the necessary information.

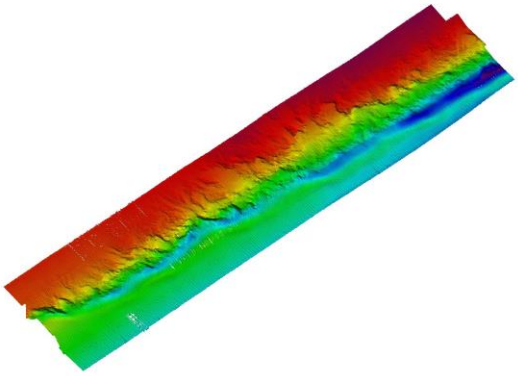
Teacher Preparation: To teach this lesson it's important to have working computers and an internet connection.

Keywords:

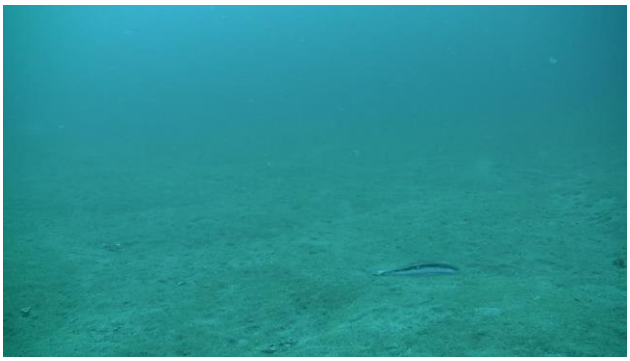
Fish: Tomtate, White grunt, Bank seabass, Black seabass, Spottail pinfish. Gag, Knob porgy, Gray triggerfish, Porgy, Red porgy
Chevron Trap, Species Diversity, Southeast Fishery Independent Survey (SEFIS), Bathymetric Map

Lesson Procedure:

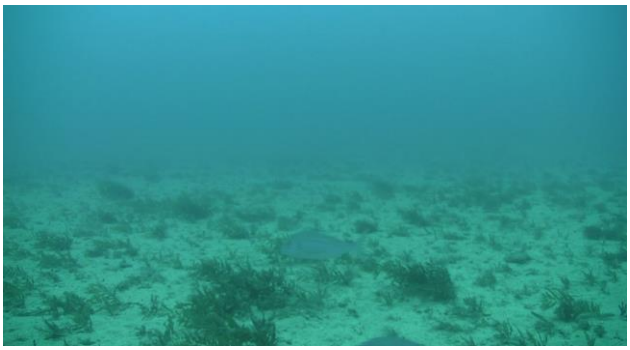
1. Whole class discussion of how to read a bathymetric Map. Red-shallowest, Blue-Deepest. Scientists are looking for steep differences in depths.



Whole class discussion of habitat quality using the following pictures obtained from the underwater cameras.



No Habitat



Sparse Habitat

Good Habitat

2. Break students up into small groups and assign them 1-2 of the fish from the list above.

Group 1: Tomtate	Group 4: Spottail Pinfish, Gag
Group 2: Black seabass, Porgy	Group 5: Gray Triggerfish, Red porgy
Group 3: White grunt	Group 6: Bank seabass, Knob porgy

- Traps 1 & 2 had the least amount of fish so this should be a smaller group (ideally 2-3)*
- Have students research their assigned fish (physical description, life span, reproduction, size, habitat) and write information on index cards to be photocopied and shared.
- Have student's jigsaw information so that each group has information on all the fish.
- Students need to print out 6 pictures of their fish to distribute to each group

3. Pass out Box 40 and have students work in their small groups to predict where they think the chief scientist might drop the 6 chevron traps.

Using the digital camera and project box 40, show students where traps were actually dropped in box 40 and discuss the depth difference. Box 40 is about 8km long and .75km wide
Depth of the area: 16fathoms-96feet-29m -31m

4. Assign each group one of the 6 boxes

-Pass out envelopes containing the fish that were caught in that trap (data provided from the SEFIS). Have students organize data especially if you cut up each strip of length numbers.
- Have students log onto chromebooks and have them sign into Schoology where I have posted videos for traps 1-6.
    - In small groups students need to watch the 5 minute clips and identify the types of fish seen and the number of each type.
    - Incorporate this data with the fish numbers that went into the trap, record data.
- Analyze the type of habitat by comparing your video footage to the provided habitat indicator pictures/video.

5. Once you have finished analyzing the video and recording all the fish (# and species) use this data in addition to the provided data to create a graph of the abundance of fish in your area. Use time as the independent variable and the number of fish as your dependent variable. Remember TAILS (title, axis, interval, label, scale). On your graph please write down what type of environment it is.

- Take a picture of your graph and post it to schoology.

6. Log onto your schoology account and find the 6 graph pictures that should have been uploaded yesterday.

7. Using your data as well as the data obtained from your classmates individually write a conclusion statement explaining whether box 40 would be a good hard-bottom environment for fish and whether you would recommend this location to a fisherman trying to catch White Grunt.

Assessment and Evaluation:

Background Information: **1. Where did the data you analyzed come from?** **2. Quick overview of the fish that you found in your trap.** **3. Description of the habitat quality.**	Student answered all three questions in detail and all answers are accurate and complete 4	Student answered 1-3 of the questions and answers may be incomplete or inaccurate. 2-3	Students attempted the questions but information is incomplete or inaccurate. 0-1	__/4
Video Recordings **1. How was the video analyzed** **2. Any possible errors in your data from video analysis**	Student answered all questions in detail and all answers are accurate and complete 3	Student answered 1 question and answers may be incomplete or inaccurate. 2	Students attempted the questions but information is incomplete or inaccurate. 0-1	__/3
Data Collection Table	Data table is present, clearly labeled and easy to understand 3	Data table is present but may be hard to understand not clearly labeled. 2	Data table is missing and or hard to follow and understand 1	__/3
Graph	Graph follows TAILS rules and includes a legend. Neatly done and easy to understand. 3-4		Graph is missing one or more elements from TAILS may be hard to understand. 0-2	__/4
Is Box 40 a good habitat?	Student answers the question and supports answer with data. 2	Student answers the question but does not support answer with data. 1	Student does not answer the question. 0	__/2
Would you recommend this area for White Grunt fishermen?	Student answers the question and supports answer with data. 2	Student answers the question but does not support answer with data. 1	Student does not answer the question. 0	__/2
Group Responsibility Score	All group members took responsibility of the project and put in their best effort 3	Group members worked together most of the time but some took more responsibility than others 2	Group did not work well together students did not take responsibility for their work 1	__/3
			Total	___/21

Standards:

Next Generation Science Standard(s) Addressed:

2-LS4 Biological Evolution: Unity and Diversity

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Students who demonstrate understanding can:

2-LS4-1. **Make observations of plants and animals to compare the diversity of life in different habitats.** [Clarification Statement: Emphasis is on the diversity of living things in each of a variety of different habitats.] [*Assessment Boundary: Assessment does not include specific animal and plant names in specific habitats.*]

The performance expectations above were developed using the following elements from the NRC document *A Framework for K-12 Science Education*:

Science and Engineering Practices

Planning and Carrying Out Investigations
Planning and carrying out investigations to answer questions or test solutions to problems in K–2 builds on prior experiences and progresses to simple investigations, based on fair tests, which provide data to support explanations or design solutions.

- Make observations (firsthand or from media) to collect data that can be used to make comparisons. (2-LS4-1)

Connections to Nature of Science

Scientific Knowledge is Based on Empirical Evidence

- Scientists look for patterns and order when making observations about the world. (2-LS4-1)

Disciplinary Core Ideas

LS4.D: Biodiversity and Humans

- There are many different kinds of living things in any area, and they exist in different places on land and in water. (2-LS4-1)

Crosscutting Concepts

Connections to other DCIs in second grade: N/A

Articulation of DCIs across grade-levels:
3.LS4.C (2-LS4-1); **3.LS4.D** (2-LS4-1); **5.LS2.A** (2-LS4-1)

Common Core State Standards Connections:

ELA/Literacy —

W.2.7 Participate in shared research and writing projects (e.g., read a number of books on a single topic to produce a report; record science observations). (2-LS4-1)

W.2.8 Recall information from experiences or gather information from provided sources to answer a question. (2-LS4-1)

Mathematics —

MP.2 Reason abstractly and quantitatively. *(2-LS4-1)*

MP.4 Model with mathematics. *(2-LS4-1)*

2.MD.D.10 Draw a picture graph and a bar graph (with single-unit scale) to represent a data set with up to four categories. Solve simple put-together, take-apart, and compare problems using information presented in a bar graph. *(2-LS4-1)*

Ocean Literacy Principles Addressed: The ocean supports a great diversity of life and ecosystems.

A. Ocean life ranges in size from the smallest living things, microbes, to the largest animal on Earth, blue whales.

B. Most of the organisms and biomass in the ocean are microbes, which are the basis of all ocean food webs. Microbes are the most important primary producers in the ocean. They have extremely fast growth rates and life cycles, and produce a huge amount of the carbon and oxygen on Earth.

C. Most of the major groups that exist on Earth are found exclusively in the ocean and the diversity of major groups of organisms is much greater in the ocean than on land.

D. Ocean biology provides many unique examples of life cycles, adaptations, and important relationships among organisms (symbiosis, predator-prey dynamics, and energy transfer) that do not occur on land.

E. The ocean provides a vast living space with diverse and unique ecosystems from the surface through the water column and down to, and below, the seafloor. Most of the living space on Earth is in the

ocean.

F. Ocean ecosystems are defined by environmental factors and the community of organisms living there. Ocean life is not evenly distributed through time or space due to differences in abiotic factors such as oxygen, salinity, temperature, pH, light, nutrients, pressure, substrate, and circulation. A few regions of the ocean support the most abundant life on Earth, while most of the ocean does not support much life.

G. There are deep ocean ecosystems that are independent of energy from sunlight and photosynthetic organisms. Hydrothermal vents, submarine hot springs, and methane cold seeps, rely only on chemical energy and chemosynthetic organisms to support life.

H. Tides, waves, predation, substrate, and/or other factors cause vertical zonation patterns along the coast; density, pressure, and light levels cause vertical zonation patterns in the open ocean. Zonation patterns influence organisms' distribution and diversity.

I. Estuaries provide important and productive nursery areas for many marine and aquatic species.

http://www.coexploration.org/oceanliteracy/documents/OceanLitChart.pdf